The Energy Sector: Weather Information Needs & "Lessons Learned"

Diana Roth, Ph.D.

CIRES Science & Technology Policy Center

University of Colorado

Examples: Range of Weather Info Needs

"Basic End-User"

Farmer:

- Evaluates short and long term forecasts from news media to determine crop schedule issues (e.g., harvest timing)
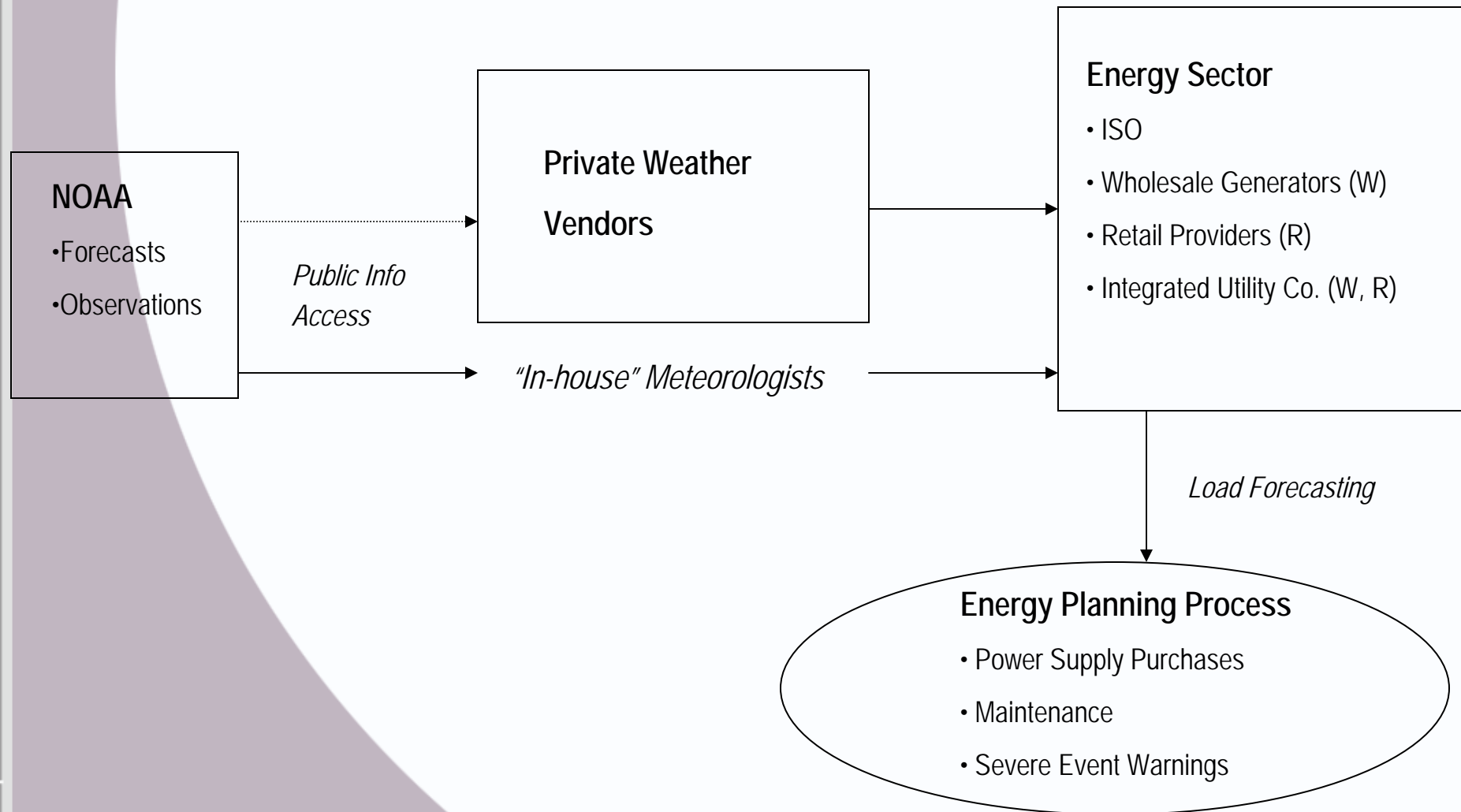
Skier:

- Wants to know road and slope conditions

"Sophisticated End-User"

Energy Forecaster:

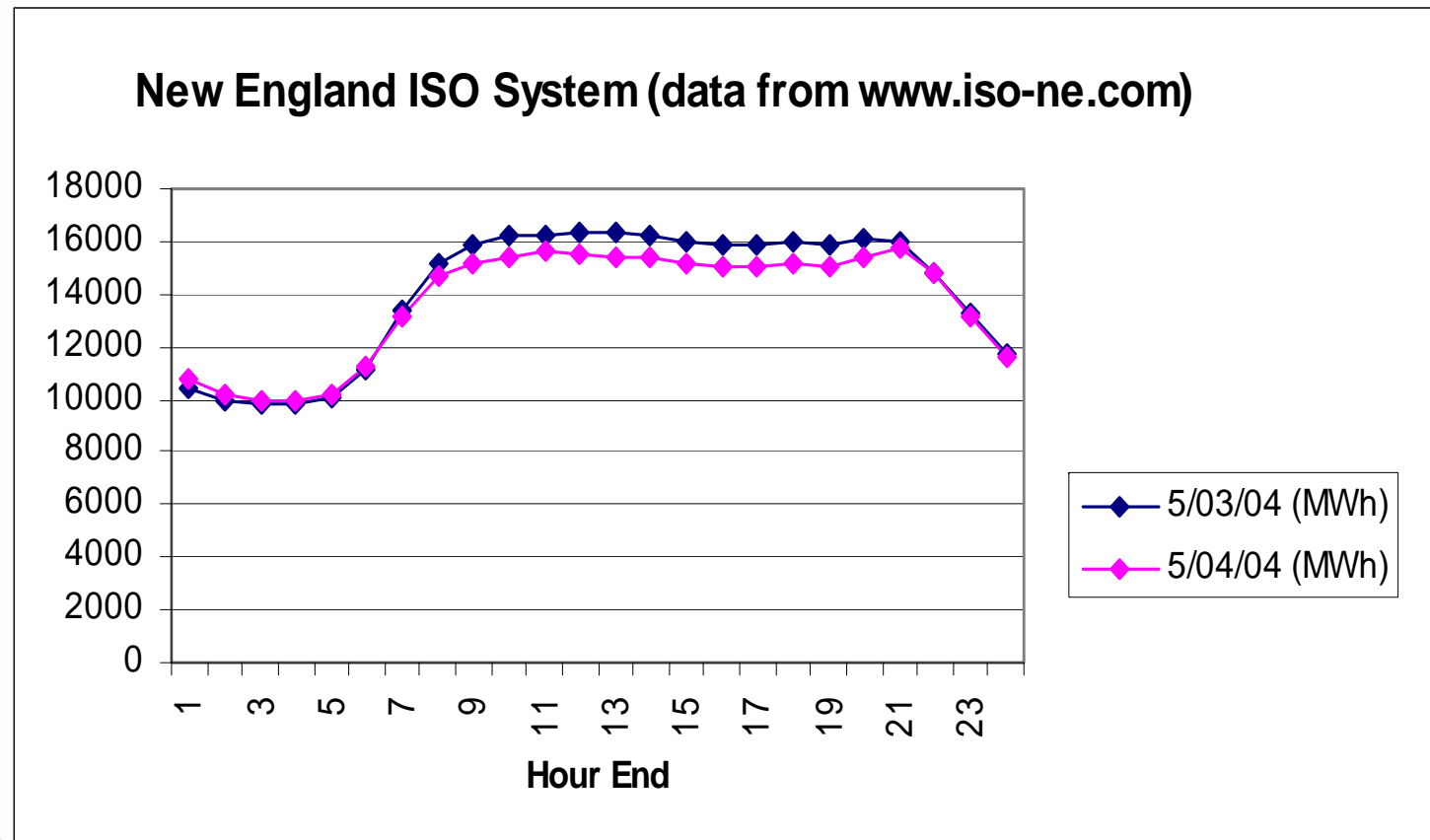- "Feed" weather data into energy load forecast model via FTP server (e.g., via weather service provider)

Generalized Flow of Weather Information

NOAA to Energy Sector

NOAA

•Forecasts

•Observations

Public Info Access

Private Weather Vendors

"In-house" Meteorologists

Energy Sector

• ISO

• Wholesale Generators (W)

• Retail Providers (R)

• Integrated Utility Co. (W, R)

Load Forecasting

Energy Planning Process

• Power Supply Purchases

• Maintenance

• Severe Event Warnings

Example of "Energy Load Data"
2-day forecast

New England ISO System (data from www.iso-ne.com)

Legend:
- 5/03/04 (MWh)
- 5/04/04 (MWh)

X-axis: Hour End (1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23)
Y-axis: 0 to 18000

Why is Weather Important to the Energy Sector?

Background:

- Since mid-1990s, deregulation of the electric power industry has enabled power generators to charge competitive market prices. Prices were previously regulated at the variable cost of production (fuel cost * heat rate)

- With energy market competition, energy prices have become more vulnerable to unexpected weather events

- For example: Heat waves & tight reserve margins in 1998-1999 contributed to spikes in electricity spot prices

Lessons Learned

Two recent workshops &/or conferences addressing the relationship between weather & the energy sector:

• Increasing the Value of Weather Information in the Operation of the Electric Power System (2002), workshop at NCAR (ESIG)

• Weather, Climate & Energy: A policy forum developed by the Atmospheric Policy Program (AMS) in collaboration with University of Oklahoma (2001)

Lessons Learned

Weather research needs and use patterns identified at NCAR workshop:

- Weather Research Needs:
  - Improved temperature and wind forecasts
  - Precise timing on front arrival
  - Improved extreme event information
  - Deviation from climatology
  - Other issues: urban weather (heat island), cloud cover and QPF…

- Patterns of Use of Weather Information:
  - Poor perception of forecast reliability (non-applicable weather vars)
  - Inability to use some detailed info (e.g. data format)
  - Preference for deterministic data (vs. probabilistic)

Summary

Recommendations to NOAA (AMS forum):

- "Working in partnership with private-sector meteorological service providers, *expand efforts to educate the energy sector on NWS and NESDIS products that can improve its use of the data in decision making and risk management...*"

- "Focus the next generation of satellite systems not just on sensors, but on better application of data and algorithms that make the information *more applicable to energy sector needs*"

Summary

Ideas for "next steps" (AMS forum):

- "Promote continued dialogue between energy industry and meteorological community through a series of round tables"

- "Build connections with … energy associations to develop short courses at meetings to inform participants about meteorological information and services that can be used for decision making and risk management"

Summary

Other suggestions for "next steps" (NCAR workshop):

- Small workshops on specific topics with focused stakeholder exchanges

- Assemble educational materials for energy industry about modern capabilities of weather forecasting

- Demonstration project re: potential value of probabilistic forecasts with application to a particular business decision

Looking Ahead

- NOAA weather forecast provides baseline for the Nation

- Key Issue: Need for integrative work to improve communication and the flow of information

- Planning for the Future: Unique aspects of NEHRTP planned workshop (as compared to previous workshops)
  - Regional (New England) & high resolution temperature foci
  - Funding for improved baseline weather services
  - Greater role of intermediaries planned